# Volunteer Lake Assessment Program Individual Lake Reports

## GARDNER, LAKE, BATH, NH

**MORPHOMETRIC DATA**

| | | | | | |
|---|---|---|---|---|---|
| **Watershed Area (Ac.):** | 141 | **Max. Depth (m):** | 4.7 | **Flushing Rate (yr$^{-1}$)** | 0.8 |
| **Surface Area (Ac.):** | 25 | **Mean Depth (m):** | 2.6 | **P Retention Coef:** | 0.81 |
| **Shore Length (m):** | 1,100 | **Volume (m$^3$):** | 256,500 | **Elevation (ft):** | 665 |

**TROPHIC CLASSIFICATION**

| Year | Trophic class |
|---|---|
| 1985 | OLIGOTROPHIC |
| | |

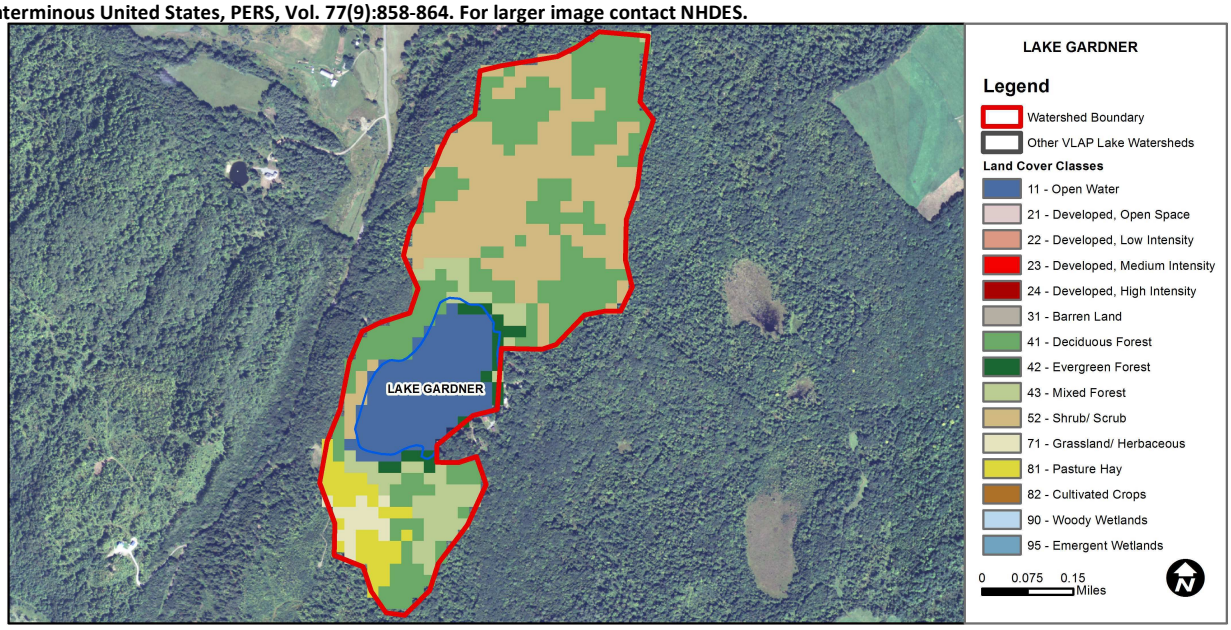
**KNOWN EXOTIC SPECIES**

**The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm**

| Designated Use | Parameter | Category | Comments |
|---|---|---|---|
| Aquatic Life | Phosphorus (Total) | Cautionary | The calculated median is fewer than 5 samples but > indicator and the chlorophyll a indicator is okay. More data needed. |
| | pH | Encouraging | < 10 samples and no exceedance of criteria. More data needed. |
| | Oxygen, Dissolved | Encouraging | There are < 10 samples with 0 exceedances of criteria. More data needed. |
| | Dissolved oxygen satura | Encouraging | There are < 10 samples with 0 exceedances of criteria. More data needed. |
| | Chlorophyll-a | Good | The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator. |
| Primary Contact Recreation | Escherichia coli | Very Good | Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria. |
| | Cyanobacteria hepatoto | Slightly Bad | Cyanobacteria bloom(s). |
| | Chlorophyll-a | Encouraging | There are < 10 samples with 0 exceedances of indicator. More data needed. |

**WATERSHED LAND USE SUMMARY**

**Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.**




| Land Cover Category | % Cover | Land Cover Category | % Cover | Land Cover Category | % Cover |
|---|---|---|---|---|---|
| Open Water | 15.2 | Barren Land | 0 | Grassland/Herbaceous | 2.24 |
| Developed-Open Space | 0 | Deciduous Forest | 35.24 | Pasture Hay | 5.17 |
| Developed-Low Intensity | 0 | Evergreen Forest | 2.8 | Cultivated Crops | 0 |
| Developed-Medium Intensity | 0 | Mixed Forest | 8.39 | Woody Wetlands | 0 |
| Developed-High Intensity | 0 | Shrub-Scrub | 31.19 | Emergent Wetlands | 0 |

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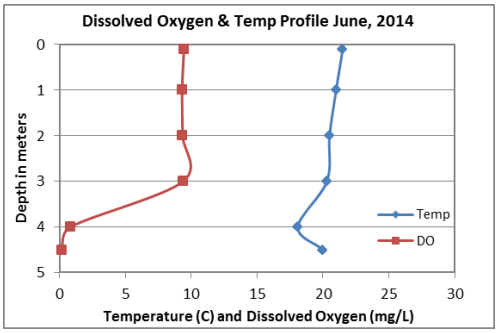
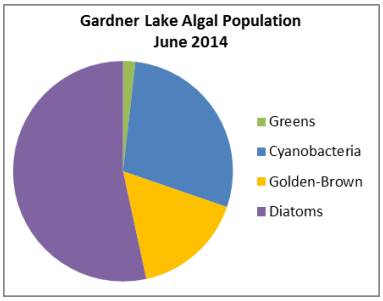
## Gardner Lake, Bath

## 2014 Data Summary

**Observations and Recommendations** (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **Chlorophyll-a:** Chlorophyll levels were slightly elevated in June and August. An algal bloom was noted in the cove in August and the algae were identified as cyanobacteria. The pond has experienced cyanobacteria blooms in late summer/early fall in recent years. The 2014 average chlorophyll levels increased from 2013 and were greater than the state median. Visual inspection of historical data indicates relatively stable chlorophyll levels since monitoring began.
- **Conductivity/Chloride:** Deep spot and tributary conductivity and/or chloride levels remained average and were approximately equal to the state medians. Visual inspection of historical data indicates stable epilimnetic (upper water layer) conductivity since monitoring began.
- **E. coli:** Near-shore E. coli levels were low and much less than the state standard of 88 cts/100 mL for public beaches and 406 cts/100 mL for surface waters.
- **Total Phosphorus:** Epilimnetic phosphorus levels were within an average range in June and August. Average epilimnetic phosphorus levels decreased slightly from 2013 and were approximately equal to the state median. Visual inspection of historical data indicates stable epilimnetic phosphorus since monitoring began. Tributary phosphorus levels were higher in June following a significant storm event, however were within an average range. Tributary phosphorus levels were low in August.
- **Transparency:** Transparency measured without the viewscope (NVS) remained stable from June to August and was slightly less (worse) than 2013 and the state median. However, transparency measured with the viewscope (VS) was much better than that measured without in June and was equal to the NVS reading in August. Visual inspection of historical data indicates slightly increasing (improving) transparency since monitoring began.
- **Turbidity:** Epilimnetic turbidity was average in June and elevated in August due to the algal bloom. Minot Inlet turbidity was average. Outlet turbidity was elevated in August. Scruggs Inlet and Underground Spring turbidities were low. Vesilind turbidity was slightly elevated in June following the storm event.
- **pH:** Deep spot and tributary pH levels were within the desirable range 6.5-8.0 units. Visual inspection of historical data indicates slightly variable epilimnetic pH since monitoring began.
- **Recommended Actions:** Algal growth was elevated and the lake experienced another brief cyanobacteria bloom in August. Lake levels were high throughout the summer, and the lack of flushing of lake water can concentrate nutrients and make them available for algal growth. Cyanobacteria can also utilize nitrogen, another nutrient, and outcompete other algae. Conduct nitrogen sampling at the deep spot to better understand phosphorus and nitrogen levels in the lake. Maintain water flow through the Outlet to maintain a normal water level and help flush nutrients out of the lake. Keep up the great work!




| Station Name | Table 1. 2014 Average Water Quality Data for LAKE GARDNER-BATH | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Alk. mg/l | Chlor-a ug/l | Chloride mg/l | Cond. uS/cm | E. Coli #/100ml | Total P ug/l | Trans. m | | Turb. ntu | pH |
| | | | | | | | NVS | VS | | |
| Epilimnion | 14.2 | 5.34 | 3 | 39.7 | | 13 | 2.95 | 3.34 | 1.91 | 7.12 |
| Hypolimnion | | | | 40.9 | | 15 | | | 2.33 | 7.06 |
| O Brooks | | | | | 10 | | | | | |
| Cove | | | | | 21 | | | | | |
| Kelso | | | | | 10 | | | | | |
| Minot Inlet | | | | 34.7 | | 12 | | | 1.53 | 6.55 |
| Outlet | | | | 41.1 | | 13 | | | 2.11 | 6.97 |
| Ricker | | | | | 10 | | | | | |
| Scruggs Inlet | | | | 41.8 | | 10 | | | 0.97 | 6.81 |
| Shady Lane | | | | | 10 | | | | | |
| Underground Spring | | | | 45.9 | | 9 | | | 0.92 | 6.74 |
| Vesilind Inlet | | | | 34.2 | | 9 | | | 2.36 | 6.54 |

**NH Water Quality Standards:** Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
**Chloride:** > 230 mg/L (chronic)
**E. coli:** > 88 cts/100 mL – public beach
**E. coli:** > 406 cts/100 mL – surface waters
**Turbidity:** > 10 NTU above natural level
**pH:** between 6.5-8.0 (unless naturally occurring)

**NH Median Values:** Median values for specific parameters generated from historic lake monitoring data.
**Alkalinity:** 4.9 mg/L
**Chlorophyll-a:** 4.58 mg/m$^3$
**Conductivity:** 40.0 uS/cm
**Chloride:** 4 mg/L
**Total Phosphorus:** 12 ug/L
**Transparency:** 3.2 m
**pH:** 6.6

### Historical Water Quality Trend Analysis

| Parameter | Trend | Explanation | Parameter | Trend | Explanation |
|---|---|---|---|---|---|
| Conductivity | N/A | Ten consecutive years of data necessary for analysis. | Chlorophyll-a | N/A | Ten consecutive years of data necessary for analysis. |
| pH (epilimnion) | N/A | Ten consecutive years of data necessary for analysis. | Transparency | N/A | Ten consecutive years of data necessary for analysis. |
| | | | Phosphorus (epilimnion) | N/A | Ten consecutive years of data necessary for analysis. |